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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/333,783	06/15/1999	RALPH PRINGLE JR.	970376	4506

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EXAMINER

MEYER, DAVID C

ART UNIT	PAPER NUMBER
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2878

DATE MAILED: 04/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/333,783

Applicant(s)

PRINGLE, RALPH

Examiner

David C. Meyer

Art Unit

2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 June 1999.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 7-10 is/are rejected.
- 7) ☒ Claim(s) 2-6 and 11-15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claim 10 is objected to because of the following informalities: In lines 2-3, claim 10 recites the limitation "the adaptive optics system". There is insufficient antecedent basis for this limitation in the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Cochran (US 4,750,818). Cochran discloses a method of operating an adaptive optics system, the system comprising a deformable mirror **30** that is illuminated with optical energy, a phase shifter array **24** having a plurality of actuators **28**, a wavefront sensor (detector array **22**) having subapertures, and a processor (digital means **32**) that processes wavefront slope measurements and generates commands for controlling the actuators. The processor performs a matrix multiplication function wherein an estimation matrix multiplies wavefront slope data in order to generate actuator commands for deforming portions of mirror **30**. The estimation matrix is employed to "maximize performance assuming certain systems and environmental conditions" and may be used to calibrate for weather effects or intensity (amplitude) fluctuations. The estimation

matrix, therefore, accommodates a slope weighting function. (See column 4, line 16 to column 6, line 20.)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cochran (US 4,750,818). Cochran does not disclose that deformable mirror **30** is controlled by 941 actuators. Absent any showing of criticality, the specific number of actuators employed would have been obvious to one of ordinary skill in the art at the time of invention in view of the desired performance and system cost.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cochran (US 4,750,818) in view of Rather et al (US 4,825,062). Cochran does not disclose for each subaperture a corresponding plurality of actuators. Rather et al teaches an adaptive optics system comprising a wavefront sensor having a plurality of subapertures which correspond one-to-one with segments **44** of a deformable mirror **40** (column 9, lines 37-40). Rather et al discloses that each mirror segment is controlled by a plurality of actuators **54,56,58** (column 4, lines 57-64). The specific number of actuators associated with each subaperture would have been obvious to one of ordinary skill in the art at the time of invention in view of the desired performance and system cost.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cochran (US 4,750,818) in view of Wisner et al (US 4,217,355). Cochran does not disclose a servo compensator for controlling the actuators. It is well known to use a servo control system in conjunction with an adaptive optics system as taught by Wisner et al. Wisner et al discloses an adaptive optics system comprising a servo control system **44** that receives an electrical signal from a radiation detector **36** and outputs correction signals **52** to actuators **20** disposed on the back surface of a deformable mirror **32**. It would have been obvious to one of ordinary skill in the art at the time of invention to employ a servo compensator to control the actuators in order to achieve a reliable and accurate system control.

Allowable Subject Matter

8. Claims 2-6 and 11-15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: Regarding claims 2-6 and 11-15, the prior art of record does not disclose calculating the average of the amplitudes detected in the wavefront sensor's subapertures or using an average amplitude to perform a weighting function.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Friedman et al (US 6,278,100) appears to disclose all the elements of claim 1.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David C. Meyer whose telephone number is 703-305-7955. The examiner can normally be reached on M-F 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on 703-308-4852. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0935.

DCM
March 31, 2003


DAVID PORTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800